

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平9-329754

(43) 公開日 平成9年(1997)12月22日

(51) Int.Cl.⁶

G 0 2 B 26/10

識別記号

庁内整理番号

F I

G 0 2 B 26/10

技術表示箇所

F

審査請求 未請求 請求項の数3 F D (全 5 頁)

(21) 出願番号 特願平8-168524

(22) 出願日 平成8年(1996)6月7日

(71) 出願人 000001007

キヤノン株式会社

東京都大田区下丸子3丁目30番2号

(72) 発明者 富田 健一

東京都大田区下丸子3丁目30番2号 キヤ
ノン株式会社内

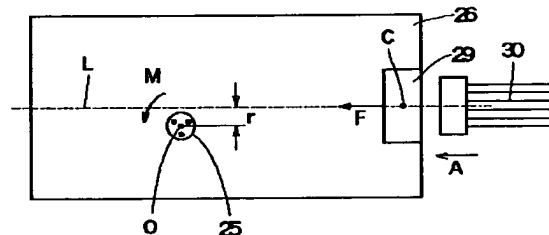
(74) 代理人 弁理士 日比谷 征彦

(54) 【発明の名称】 射出光学装置

(57) 【要約】

【目的】 電気回路基板に圧力を加えることなく、コネクタとケーブルを接続して装置の回転を防止する。

【構成】 電気回路基板26上のコネクタ29の中心Cを通り矢印Aと平行な仮想線Lを設け、仮想線Lと電気回路基板26における半導体レーザー光源25の取付中心Oとの距離rと、ハーネス30を着脱する際のコネクタ29に加わる力Fとの積が、所定値以下となるように電気回路基板26上のコネクタ29の位置を決定し、このコネクタ29に対し矢印Aで示す水平方向にハーネス30を接続する。



【特許請求の範囲】

【請求項1】 半導体レーザー光源と、該半導体レーザー光源から出射されたレーザー光を平行光にするコリメータレンズと、前記半導体レーザー光源を駆動する電気回路基板と、前記半導体レーザー光源を保持する支持部材とを有し、前記電気回路基板上に前記半導体レーザー光源を駆動する電源及び電気信号を伝達するケーブルを接続するためのコネクタを設け、該コネクタと前記ケーブルの取付方向を前記電気回路基板に対して水平方向とし、該取付方向と平行でかつ前記コネクタの中心を通る仮想線から、前記電気回路基板上における前記半導体レーザー光源の取付中心位置までの距離と前記コネクタの取り付け/取り外しに加わる力との積が所定の値以下となるように前記コネクタの位置を設定したことを特徴とする射出光学装置。

【請求項2】 前記コネクタの中心を通る仮想線から前記半導体レーザー光源の取付中心位置までの距離を r (cm)、前記コネクタの取り付け/取り外しに加わる力を F (kg)とすると、 $F \cdot r \leq 3$ (kgf・cm)なる関係を有する請求項1に記載の射出光学装置。

【請求項3】 前記半導体レーザー光源は複数の光ビームを出射するマルチビームレーザー光源とした請求項1に記載の射出光学装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、レーザービームコリメータユニットや、半導体レーザー光源を用いた光ディスクのピックアップユニットなどに供する射出光学装置に関するものである。

【0002】

【従来の技術】従来から、画像信号により変調されたレーザービームを記録媒体上に走査して、画像を記録するレーザービームプリンタなどの記録装置が一般に知られている。

【0003】図5は従来の射出光学装置の斜視図を示し、半導体レーザー光源1の前方の光路上には、コリメータレンズ2、ポリゴンミラーなどの偏向器3が配列され、偏向器3の反射方向の光路上には、結像レンズ光学系4、記録媒体である感光ドラム5が配列されている。

【0004】画像信号により変調された半導体レーザー光源1からのレーザービームは、コリメータレンズ2により平行光とされ、偏向器3により偏向されて、結像レンズ光学系4によって記録媒体5上に結像走査される。このようにして、レーザービームプリンタなどのレーザーユニットに使用する場合には、半導体レーザー光源1からの出射光は発光点から放射状に拡がる性質を有するために、コリメータレンズ2を用いて平行光束とするのが一般的である。

【0005】図6はレーザーユニットの断面図を示し、図7は図6のZ方向から見た背面図である。基台10の

背面には電気回路基板11が取り付けられ、基台10の前面にはホルダ12がばね付きねじ13a、13bにより固定されている。横断面が略凸状に形成されたホルダ12は基台10の調整治具の基準部分に固定されており、ホルダ12の中空内部にはコリメータレンズ2を設けた鏡筒14が嵌合され、ホルダ12の中空内部の略中心付近の基台10上には半導体レーザー光源1が固定されている。また、電気回路基板11には各種の電子部品と共にコネクタ15が固定され、コネクタ15には信号ケーブル16が接続されている。

【0006】このような射出光学装置において、固定されたホルダ12に対して基台10をX-Y方向に微小量移動させ、コリメータレンズ2の光軸と半導体レーザー光源1の光軸とが一致するように基台10の光軸調整を行う。

【0007】先ず、調整前にばね付きねじ13a、13bを緩めた半固定状態で、基台10とホルダ12を固定し、この状態で所定の範囲内に調整を行った後に、ばね付きねじ13a、13bを増し締めし強固に固定する。次に、鏡筒14を光軸方向のZ方向に微小量移動して所定の範囲内に調整が完了した後に、鏡筒14とホルダ12を接着固定して光学調整を完了する。光学調整が完了した射出光学装置に電気回路基板11が取り付けられた後に、光学部材を収納する図示しない光学箱に取り付け、更に光学箱は図示しない記録装置本体に取り付けられ、電気回路基板11上のコネクタ15に信号ケーブル16が接続される。

【0008】

【発明が解決しようとする課題】しかしながら上述の従来例においては、コネクタ15の接続方向が電気回路基板11に垂直な場合には、接続の際に電気回路基板11を曲げる方向に力加わるために、電気回路基板11自体及び電気回路基板11上の電子素子が破損したり剥離したりすることがある。また、コネクタ15の接続方向が電気回路基板11に水平な場合には、コネクタ15の位置によって射出光学装置に回転方向の力加わるために、射出光学装置が回転することがあり、特に複数のビームの間隔を高精度に調整しているマルチビームレーザー光源を用いた場合には、これが致命的な欠陥となる。

【0009】本発明の目的は、上述の問題点を解消し、電気回路基板に圧力を加えることなくコネクタとケーブルの接続を行い装置の回転を防止する射出光学装置を提供することにある。

【0010】

【課題を解決するための手段】上記目的を達成するための本発明に係る射出光学装置は、半導体レーザー光源と、該半導体レーザー光源から出射されたレーザー光を平行光にするコリメータレンズと、前記半導体レーザー光源を駆動する電気回路基板と、前記半導体レーザー光源を保持する支持部材とを有し、前記電気回路基板上に

前記半導体レーザー光源を駆動する電源及び電気信号を伝達するケーブルを接続するためのコネクタを設け、該コネクタと前記ケーブルの取付方向を前記電気回路基板に対して水平方向とし、該取付方向と平行でかつ前記コネクタの中心を通る仮想線から、前記電気回路基板上における前記半導体レーザー光源の取付中心位置までの距離と前記コネクタの取り付け/取り外しに加わる力との積が所定の値以下となるように前記コネクタの位置を設定したことを特徴とする。

【0011】

【発明の実施の形態】本発明を図1～図4に図示の実施例に基づいて詳細に説明する。図1は第1の実施例の射出光学装置の斜視図を示し、記録装置本体20上には光学箱21が取り付けられ、光学箱21にはホルダ22が固定されている。光学箱21の内部において、ホルダ22にはコリメータレンズ23を内設する鏡筒24と半導体レーザー光源25が支持されており、鏡筒24は光軸調整及びピント調整のためにXYZ方向にそれぞれ移動可能とされている。

【0012】また、光学箱21の外側にはホルダ22に半導体レーザー光源25を駆動する電気回路基板26が固定されており、射出光学装置が光学箱21にねじ27によって取り付けられ、電気回路基板26はコントローラ28とコネクタ29、ハーネス30を介して接続されている。

【0013】図2は電気回路基板26の正面図を示し、電気回路基板26上のコネクタ29に対しハーネス30は、矢印A方向の電気回路基板26と水平方向に接続されている。ここで、コネクタ29の中心Cを通り矢印Aと平行な仮想線Lを設け、仮想線Lと電気回路基板26における半導体レーザー光源25の取付中心Oとの距離を r (cm)とし、コネクタ29に加わるハーネス30を着脱する力を F (kgf)とすると、 $F \cdot r \leq 3$ (kgf・cm)の関係となるようにコネクタ29の位置を決定する。

【0014】この関係式は実験的に得られたものであり、実験では $F = 2$ kgf、 $r = 3$ cmのときホルダ22の回転が生じたことが分かっているため、これからホルダ22に加わるモーメントは 6 kgf・cm以下となり、上記の式は安全率を2倍に見込んで 3 kgf・cm以下としている。また、コネクタ29の着脱に必要な力は最大で 6 kgf程度であることが実験で得られているため、上記の式から $r = 0.5$ cmとなる。

【0015】このような位置にコネクタ29を配置して矢印A方向にハーネス30の接続を行えば、コネクタ29にハーネス30を着脱する際の電気回路基板26に加わる力は矢印Aと同じ方向になるので、電気回路基板26を曲げるような力を加えることがなくなり、更に射出光学装置を回転させるモーメント力を小さく抑えることができ、射出光学装置が位置ずれを生ずるという問題を

回避することができる。

【0016】図3は第2の実施例の射出光学装置の斜視図、図4は半導体レーザー光源の正面図を示し、図1と同じ番号は同じ部材を表している。ホルダ22には、複数の光源を有するマルチビーム半導体レーザー光源31とコリメータレンズ23及び電気回路基板26が支持されており、電気回路基板26にはコネクタ29が固定されている。

【0017】ビーム間距離の調整は、2個以上の複数の光源を有するマルチビーム半導体レーザー光源31の全てについて同様に行うことができるので、ここでは2個の光源を有する半導体レーザー光源31について説明する。まず、半導体レーザー光源31の2個の発光点31a、31bのY方向の初めの間隔を t_1 とし、次に半導体レーザー光源31をホルダ22により図4の矢印B方向に回転させると、発光点31a、31bのY方向の距離は小さくなり間隔 t_2 となる。

【0018】ここで、ホルダ22と電気回路基板26が固定されているために、電気回路基板26を回転させる方向の力 F が加わると調整が狂ってしまう危険性がある。従って、コネクタ29の中心を通る仮想線Lから近い方の発光点31a又は31bまでのY方向の距離 r' が、第1の実施例と同様に $F \cdot r' \leq 3$ となるようにコネクタ29の位置を設定すれば、ビーム間距離の調整を狂わせる危険性を回避することができる。

【0019】

【発明の効果】以上説明したように本発明に係る射出光学装置は、コネクタとケーブルを接続する方向を電気回路基板に対して水平方向とし、取付方向と平行でかつコネクタの中心を通る仮想線から電気回路基板上における半導体レーザー光源の取付中心までの距離と、コネクタの取り付け/取り外しに加わる力との積を、所定の値以下となるようにコネクタの位置決めを行うことにより、電気回路基板に圧力を加えることなくコネクタとケーブルの接続を行うことができ、電気回路基板自体や電気回路基板上の電子素子の破損や剥離を防止し、更に射出光学装置の回転を回避することができる。

【図面の簡単な説明】

【図1】第1の実施例の射出光学装置の斜視図である。

【図2】電気回路基板の平面図である。

【図3】第2の実施例の射出光学装置の斜視図である。

【図4】マルチビーム半導体レーザー光源の正面図である。

【図5】従来例の射出光学装置の斜視図である。

【図6】レーザーユニットの断面図である。

【図7】背面図である。

【符号の説明】

21 光学箱

22 ホルダ

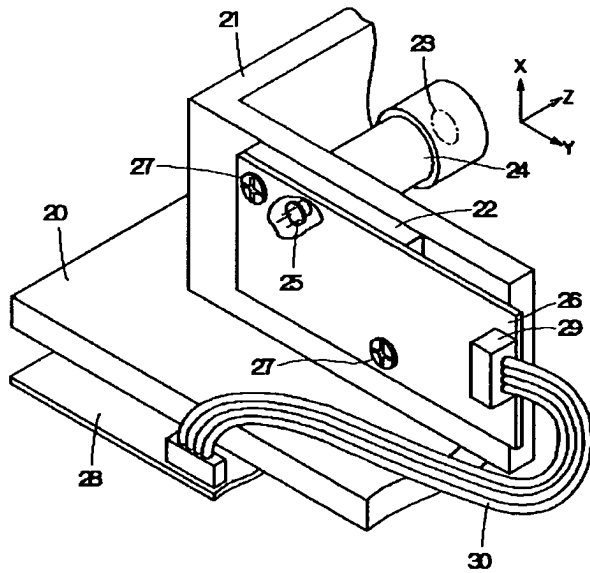
23 コリメータレンズ

24 鏡筒

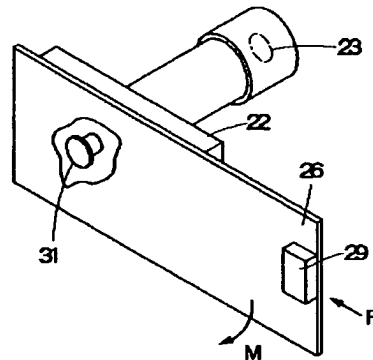
25、31 半導体レーザー光源

26 電気回路基板

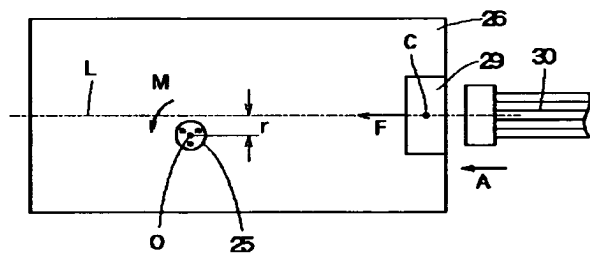
【図1】



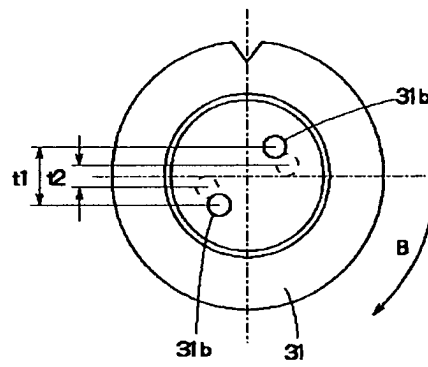
【図3】



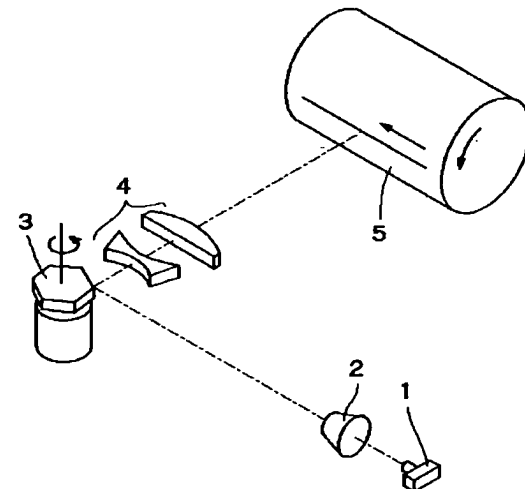
【図2】



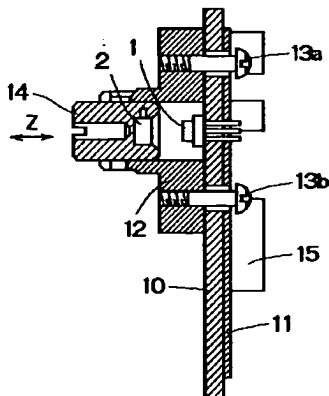
【図4】



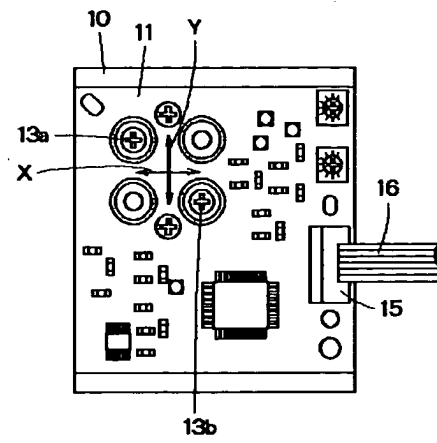
【図5】



【図6】



【図7】



PATENT ABSTRACTS OF JAPAN

(11)Publication number : **09-329754**

(43)Date of publication of application : **22.12.1997**

(51)Int.Cl.

G02B 26/10

(21)Application number : **08-168524**

(71)Applicant : **CANON INC**

(22)Date of filing : **07.06.1996**

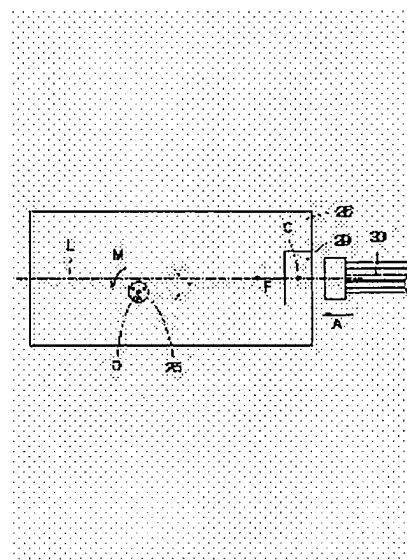
(72)Inventor : **TOMITA KENICHI**

(54) PROJECTION OPTICAL DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a device from being rotated without adding pressure to an electrical circuit board by connecting a connector and a cable.

SOLUTION: A virtual line L being in parallel with an arrow A is formed through the center C of the connector 29 on the electrical circuit board 26. Besides, the position of the connector 29 on the substrate 26 is decided so that the product of a distance (r) between the line L and the fitting center of a semiconductor laser light source 25 on the substrate 26 and force F added to the connector 29 when a harness 30 is attached and detached becomes equal to or under a prescribed value. Then, the harness 30 is connected to the connector 29 in a horizontal direction shown by the arrow A.



LEGAL STATUS

[Date of request for examination] 02.06.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3397581

[Date of registration] 14.02.2003

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the injection optical equipment with which a laser beam collimator unit, the pickup unit of an optical disk which used the semiconductor laser light source are presented.

[0002]

[Description of the Prior Art] From the former, the laser beam modulated by the picture signal is scanned on a record medium, and, generally recording devices, such as a laser beam printer which records an image, are known.

[0003] Drawing 5 shows the perspective diagram of conventional injection optical equipment, the deflecting system 3, such as a collimator lens 2 and a polygon mirror, is arranged, and the image formation lens optical system 4 and the photoconductor drum 5 which is a record medium are arranged on the optical path of the reflective direction of deflecting system 3 at the optical-path top ahead of the semiconductor laser light source 1.

[0004] The laser beam from the semiconductor laser light source 1 modulated by the picture signal is made parallel light by the collimator lens 2, it is deflected by deflecting system 3 and an image formation scan is carried out by the image formation lens optical system 4 on a record medium 5. Thus, when using it for laser units, such as a laser beam printer, since it has the property which spreads in a radial from the point emitting light, it is common [the outgoing radiation light from the semiconductor laser light source 1] to use a collimator lens 2 and to consider as the parallel flux of light.

[0005] Drawing 6 shows the cross section of a laser unit, and drawing 7 is the rear view seen from the Z direction of drawing 6.

The electrical circuit substrate 11 is attached in the back of a pedestal 10, and the holder 12 is being fixed to the front face of a pedestal 10 with the screw threads 13a and 13b with a spring. The holder 12 with which the cross section was formed in the shape of a rough convex is being fixed to the criteria portion of the Seiji Shirabe implement of a pedestal 10, the lens-barrel 14 which formed the collimator lens 2 fits into the interior of the hollow of a holder 12, and the semiconductor laser light source 1 is being fixed on the pedestal 10 near the abbreviation center inside the hollow of a holder 12. Moreover, a connector 15 is fixed to the electrical circuit substrate 11 with various kinds of electronic parts, and the signal cable 16 is connected to the connector 15.

[0006] In such injection optical equipment, the minute amount migration of the pedestal 10 is made to carry out in the direction of X-Y to the fixed holder 12, and optical-axis adjustment of a pedestal 10 is performed so that the optical axis of a collimator lens 2 and the optical axis of the semiconductor laser light source 1 may be in agreement.

[0007] First, in the state of semipermanent [which loosened the screw threads 13a and 13b with a spring before adjustment], after fixing a pedestal 10 and a holder 12 and adjusting within the limits of predetermined with this condition, tightening of the screw threads 13a and 13b with a spring is carried out, and it fixes firmly. Next, after carrying out minute amount migration of the lens-barrel 14 at the Z direction of the direction of an optical axis and completing adjustment within the limits of predetermined, adhesion immobilization of a lens-barrel 14 and the holder 12 is carried out, and optical adjustment is completed. after the electrical circuit substrate 11 attaches in the injection optical equipment which optical adjustment completed, it is attached at the optical box which contains an optical member and which is not a drawing example on the main part of installation and the recording device which an optical box does not have a drawing example further, and a signal cable 16 is connected to the connector 15 on the electrical circuit substrate 11.

[0008]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional example, since the force is added in the direction which bends the electrical circuit substrate 11 in the case of connection when the connection direction of a connector 15 is perpendicular to the electrical circuit substrate 11, the electronic device on electrical circuit substrate 11 the very thing and the electrical circuit substrate 11 may damage or exfoliate. Moreover, when the connection direction of a connector 15 is level to the electrical circuit substrate 11, in order for the force of a hand of cut to join injection optical equipment with the location of a connector 15, when the multi-beam laser light source which injection optical equipment may rotate and is adjusting the gap of two or more beams to high degree of accuracy especially is used, this serves as a fatal defect.

[0009] The purpose of this invention is to offer the injection optical equipment which makes connection of a connector and a cable and prevents rotation of equipment, without canceling an above-mentioned trouble and applying a pressure to an electrical circuit substrate.

[0010]

[Means for Solving the Problem] Injection optical equipment concerning this invention for attaining the above-mentioned purpose The semiconductor laser light source and a collimator lens which makes parallel light laser light by which outgoing radiation was

carried out from this semiconductor laser light source, It has an electrical circuit substrate which drives said semiconductor laser light source, and supporter material holding said semiconductor laser light source. A connector for connecting a cable which transmits a power supply and an electrical signal which drive said semiconductor laser light source is prepared on said electrical circuit substrate. The attachment direction of this connector and said cable is made horizontal to said electrical circuit substrate. From an imaginary line which is parallel to this attachment direction, and passes along a center of said connector It is characterized by setting up a location of said connector so that a product of distance to an attachment center position of said semiconductor laser light source on said electrical circuit substrate and force of joining installation/removal of said connector may become below a predetermined value.

[0011]

[Embodiment of the Invention] This invention is explained to drawing 1 - drawing 4 at details based on the example of illustration. Drawing 1 shows the perspective diagram of the injection optical equipment of the 1st example, the optical box 21 is attached on the main part 20 of a recording device, and the holder 22 is being fixed to the optical box 21. In the interior of the optical box 21, the lens-barrel 24 and the semiconductor laser light source 25 which install a collimator lens 23 inside are supported by the holder 22, and the lens-barrel 24 is made respectively movable in the XYZ direction for optical-axis adjustment and focus adjustment.

[0012] Moreover, the electrical circuit substrate 26 which drives the semiconductor laser light source 25 is being fixed to the outside of the optical box 21 by the holder 22, injection optical equipment ****s in the optical box 21, and is attached by 27, and the electrical circuit substrate 26 is connected with the controller 28 through the connector 29 and the harness 30.

[0013] Drawing 2 shows the front view of the electrical circuit substrate 26, and the harness 30 is horizontally connected with the electrical circuit substrate 26 of the direction of arrow head A to the connector 29 on the electrical circuit substrate 26. Here, if the imaginary line L parallel to an arrow head A is formed through the center C of a connector 29, distance based on [of the semiconductor laser light source 25 in an imaginary line L and the electrical circuit substrate 26 / O] attachment is set to r (cm) and the force which detaches and attaches the harness 30 which joins a connector 29 is set to F (kgf), it will be determined that the location of a connector 29 will become the relation of $F \cdot r \leq 3$ (kgf-cm).

[0014] Since it turns out that this relational expression was obtained experimentally and rotation of a holder 22 arose in the experiment at the time of $F=2\text{kgf}$ and $r=3\text{cm}$, the moment which will join a holder 22 from now on becomes 6 or less kgf-cm, and the above-mentioned formula expects a safety factor twice, and may be 3 or less kgf/cm. Moreover, since it is acquired in the experiment that the force required for attachment and detachment of a connector 29 is 6kgf degree at the maximum, it is set to $r=0.5\text{cm}$ from the above-mentioned formula.

[0015] If a connector 29 is arranged in such a location and a harness 30 is connected in the direction of arrow head A, since the force of joining the electrical circuit substrate 26 at the time of detaching and attaching a harness 30 to a connector 29 will become in the same direction as an arrow head A Applying the force in which the electrical circuit substrate 26 is bent can be lost, the moment force of rotating injection optical equipment further can be suppressed small, and the problem that injection optical equipment produces a location gap can be avoided.

[0016] Drawing 3 shows the perspective diagram of the injection optical equipment of the 2nd example, drawing 4 shows the front view of the semiconductor laser light source, and the same number as drawing 1 expresses the same member. The multi-beam semiconductor laser light source 31 and the collimator lens 23 which have two or more light sources, and the electrical circuit substrate 26 are supported by the holder 22, and the connector 29 is being fixed to the electrical circuit substrate 26.

[0017] Since adjustment of the distance between beams can be similarly performed about all the multi-beam semiconductor laser light sources 31 that have two or more two or more light sources, the semiconductor laser light source 31 which has the two light sources here is explained. First, if the first gap of the direction of Y of two points 31a and 31b of the semiconductor laser light source 31 emitting light is set to t_1 and then the semiconductor laser light source 31 is rotated in the direction of arrow head B of drawing 4 with a holder 22, the distance of the direction of Y of the points 31a and 31b emitting light will become small, and will serve as a gap t_2 .

[0018] Here, since the holder 22 and the electrical circuit substrate 26 are being fixed, when the force F of a direction of rotating the electrical circuit substrate 26 is added, there is a danger that adjustment will be out of order. Therefore, if distance r' of the direction of Y from the imaginary line L passing through the center of a connector 29 to emitting light point 31a or 31b of the nearer one sets up the location of a connector 29 so that it may be set to $F \cdot r' \leq 3$ like the 1st example, the danger of putting adjustment of the distance between beams out of order is avoidable.

[0019]

[Effect of the Invention] The injection optical equipment applied to this invention as explained above The distance from the imaginary line which the direction which connects a cable with a connector is made horizontal to an electrical circuit substrate, and is parallel to the attachment direction, and passes along the center of a connector to the attachment center of the semiconductor laser light source on an electrical circuit substrate, By positioning a connector so that it may become below a predetermined value about a product with the force of joining installation/removal of a connector Connection of a connector and a cable can be made without applying a pressure to an electrical circuit substrate, failure and exfoliation of the electronic device on the electrical circuit substrate itself and an electrical circuit substrate can be prevented, and rotation of injection optical equipment can be avoided further.

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram of the injection optical equipment of the 1st example.

[Drawing 2] It is the plan of an electrical circuit substrate.

[Drawing 3] It is the perspective diagram of the injection optical equipment of the 2nd example.

[Drawing 4] It is the front view of the multi-beam semiconductor laser light source.

[Drawing 5] It is the perspective diagram of the injection optical equipment of the conventional example.

[Drawing 6] It is the cross section of a laser unit.

[Drawing 7] It is rear view.

[Description of Notations]

21 Optical Box

22 Holder

23 Collimator Lens

24 Lens-barrel

25 31 Semiconductor laser light source

26 Electrical Circuit Substrate

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Have the following and a connector for connecting a cable which transmits a power supply and an electrical signal which drive said semiconductor laser light source is prepared on said electrical circuit substrate. The attachment direction of this connector and said cable is made horizontal to said electrical circuit substrate. From an imaginary line which is parallel to this attachment direction, and passes along a center of said connector Injection optical equipment characterized by setting up a location of said connector so that a product of distance to an attachment center position of said semiconductor laser light source on said electrical circuit substrate and force of joining installation/removal of said connector may become below a predetermined value. The semiconductor laser light source A collimator lens which makes parallel light laser light by which outgoing radiation was carried out from this semiconductor laser light source An electrical circuit substrate which drives said semiconductor laser light source Supporter material holding said semiconductor laser light source

[Claim 2] if force of joining r (cm), and installation/removal of said connector in distance from an imaginary line passing through a center of said connector to an attachment center position of said semiconductor laser light source is set to F (kg) -- $F \cdot r \leq 3$ (kgf-cm) -- injection optical equipment according to claim 1 which has relation.

[Claim 3] Said semiconductor laser light source is injection optical equipment according to claim 1 made into the multi-beam laser light source which carries out outgoing radiation of two or more light beams.

[Translation done.]

JP 09329754 A

TITLE: PROJECTION OPTICAL DEVICE

PUBN-DATE: December 22, 1997

INVENTOR-INFORMATION:

NAME

TOMITA, KENICHI

ASSIGNEE-INFORMATION:

NAME

COUNTRY

CANON INC

N/A

APPL-NO: JP08168524

APPL-DATE: June 7, 1996

INT-CL (IPC): G02B026/10

ABSTRACT:

PROBLEM TO BE SOLVED: To prevent a device from being rotated without adding pressure to an electrical circuit board by connecting a connector and a cable.

SOLUTION: A virtual line L being in parallel with an arrow A is formed through the center C of the connector 29 on the electrical circuit board 26. Besides, the position of the connector 29 on the substrate 26 is decided so that the product of a distance (r) between the line L and the fitting center of a semiconductor laser light source 25 on the substrate 26 and force F added to the connector 29 when a harness 30 is attached and detached becomes equal to or under a prescribed value. Then, the harness 30 is connected to the connector 29 in a horizontal direction shown by the arrow A.

COPYRIGHT: (C)1997,JPO